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## AVERAGE AND PROBABILITY.

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172. Proposed by J. EDWARD SANDERS.

A circular arc, with center at one corner of a given square, is drawn through a point at random in the square. What is the average length of the arc within the square?

172. Proposed by J. EDWARD SANDERS.

What is the average length of all straight lines that can be drawn within a given triangle?

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## GEOMETRY.

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268. Proposed by J. SCHEFFER, A. M., Hagerstown, Md.

Find, without the aid of trigonometry, the side of an inscribed regular polygon of  $2n$  sides, if the side of an inscribed regular polygon of  $n$  sides is 16 feet. [Wentworth's *Plane Geometry*, Revised Edition, problem 512, page 244.]

269. Proposed by J. SCHEFFER, A. M.

Find the area of a segment, if the chord of the segment is 10 feet, and the radius of the circle is 16 feet.

270. Proposed by F. R. HONEY, Ph. B., Hartford, Conn.

What portion of the heavens is always invisible to an observer whose latitude is given?

271. Proposed by W. J. GREENSTREET, M. A., Stroud, England.

Two equal concentric ellipses have their axes at an angle  $\theta$ . Find the area of the quadrilateral circumscribing both, in terms of  $\theta$  and the semi-axes.

272. Proposed by R. D. CARMICHAEL, Hartselle, Ala.

A point  $A$  revolves with uniform speed in a circle. A point  $B$  revolves around  $A$ , at a uniform distance from it, with the same angular velocity, but in the opposite direction. Determine the locus of  $B$ .

273. Proposed by A. H. HOLMES, Brunswick, Maine.

Required a purely geometrical solution of the problem, to find the contents of a solid generated by the revolution of a semi-segment of a circle about the sine of its arc.

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## GROUP THEORY.

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11. Proposed by SAUL EPSTEIN, Chicago, Ill.

Find the six-parameter continuous group which leaves invariant the surface of second order  $x_1x_2 - x_3x_4 = 0$ .